

### **REMARKS/ARGUMENTS**

Upon entry of this response, claims 1-5 and 8-11 are pending. The applicant respectfully requests reconsideration of the claims by the Examiner. In order to reduce the cost to the client, the applicant respectfully requests that the appeal not be reinstated at this time.

### **CLAIM REJECTIONS – 35 U.S.C. § 103**

Claims 1, 8, and 9 have been rejected under 35 U.S.C. § 103 as being unpatentable over the Song, U.S. Patent No. 6,410,944 in view of one of two Japanese published patent applications JP 42-511934 or JP 63-248164. It is respectfully submitted that none of these references, either individually or collectively, disclose or suggest the invention. More particularly, the applicant agrees with the examiner that Song does not disclose an HBT with a AlGa<sub>N</sub>/Ga<sub>N</sub> superlattice base. In order to support the rejection, the examiner relies on a combination of the teachings of the Song patent with the Japanese patent publications identified above.

With respect to the Japanese patent publication JP '934, this publication discloses a **InP/InGaAs** material system, which is totally different than the **AlGa<sub>N</sub>/Ga<sub>N</sub>** material system recited in the claims at issue. It is respectfully submitted that the examiner is reading more into this reference than it actually teaches. In particular, the examiner relies on the JP '934 patent for teaching a base layer formed from a **InP/InGaAs** superlattice. As such, it is respectfully submitted that the examiner is using the Japanese patent publication JP '934 for the broad principle that since the base is formed from a superlattice and, in particular, alternating layers of InP and InGaAs and the emitter and collector layers are formed from the same materials (InP and InGaAs) that these principles are readily combinable with the teachings of the Song patent which discloses a different material system in order to render obvious the applicant's invention. It is respectfully submitted that there are several flaws in this logic. First, it is well-known in the semiconductor art that the properties of one material system are not transferable to other material systems in semiconductor fabrication. Indeed, the Japanese patent publication JP '934 relates to a material system other than the material system recited in the claims at issue. In particular, the Japanese patent publication JP '934 relates to InP/GaAs/InGaAs material system. Notwithstanding, Fig.2(b) of the Japanese patent publication JP '934 illustrates that there are two layers identified

as 13(a) and 13(b) between the base layer 14 and the subcollector layer 12. In the case of the Japanese patent publication JP '934, the base superlattice (identified in FIG. 2 of the Japanese patent publication as with the reference numeral 14) obviously is not sandwiched between a GaN collector layer and a AlGa<sub>N</sub> emitter layer defining the base collector and base emitter interfaces as recited in the claims.

The Japanese patent publication JP '164 also discloses a material system that is different from the material recited in the claims at issue. In particular, the Japanese patent publication JP '164 discloses a **AlGaAs/GaAs** material system where the claims at issue recite a **GaN/AlGa<sub>N</sub>** material system. Even though the Japanese patent publication JP '164 teaches a **AlGaAs/GaAs** superlattice base layer it does not disclose a **AlGa<sub>N</sub>/GaN** superlattice layer as recited in the claims. Moreover, Japanese patent publication JP '164 does not disclose the interfaces as recited in the claims at issue and, in particular, the specific base collector and base emitter interfaces as recited in the claims at issue.

Accordingly, it is respectfully submitted that both of the Japanese patent publications relate to semiconductors made from different material systems than the system recited in the claims at issue. It is further respectfully submitted that the examiner has failed to provide a reference that indicates that the broad basis for which the examiner is submitting the Japanese patent publications apply to semiconductors using other material systems. Accordingly, the examiner is respectfully requested to reconsider and withdraw the rejection of claims 1, 8, and 9.

Claim 5 has been rejected under the Song reference as well as the Japanese patent publication '934 or, alternatively, the Japanese patent publication, JP '164 further in view of Razeghi, U.S. Patent No. 5, 831,277. Claim 5, similar to claim 1, also recites a base layer formed from a AlGa<sub>N</sub>/GaN superlattice and defines base collector and emitter base interfaces where in the collector layer is formed from GaN and the emitter layer is formed from AlGa<sub>N</sub>. It is respectfully submitted that for the same reasons set forth above, claim 5 defines patentable subject matter over the Song reference as well as the Japanese patent publications, either individually or collectively. The Razeghi patent was apparently cited by the examiner as disclosing a superlattice formed from AaGa<sub>N</sub>/GaN. However, as clearly shown in the figures, in which the superlattice is doped with Mg. Moreover, the Razeghi patent does not disclose the

structure recited in the claims at issue. For example, the Razeghi patent does not disclose a AlGaN emitter layer or a GaN collector layer. In fact, the Razeghi patent does not refer to an HBT at all, but rather simply a high-nitride superlattice structure. For these reasons and the above reasons, the examiner is respectfully requested to reconsider and withdraw the rejection of claim 5.

Claims 2-4, 10 and 11 have also been rejected over the Song patent and further in view of the Japanese patent publications JP '934 and JP '164. In further in view of Ohta, et al., U.S. Patent No. 4,620,206. The Ohta patent was cited for teaching "that either barrier-thickness-grading or barrier-composition-grading can be employed in superlattices to produce effective band gap changes in superlattice structures" Again, it is respectfully submitted that the examiner is attempting to apply broad teachings irrespective of the material system to which the teachings apply without providing any reference whatsoever that these teachings are applicable to other material systems. The Ohta patent, for example, is specific to a particular material system. For example, at Column 1, Lines 24-26, it states: "in this device, the Gunn is determined solely by the energy band structure of the material, ..." In fact, all of the references cited by the examiner do not mention that their teachings are applicable to other material systems. Furthermore, the claims of all of the cited patents are limited to specific material systems which further demonstrates the Applicant's position.

It is also respectfully submitted that the examiner has failed to establish a prima facie case of obviousness as required by MPEP § 2142 and § 2143. In order to establish a prima facie case of obviousness, three criteria must be met set forth in MPEP § 2143:

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations.

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The teaching or suggestion to make the claim combination a reasonable expectation of success must be found in the prior art, not in the applicant's disclosure."

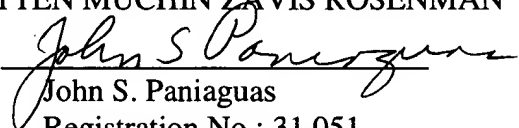
It is respectfully submitted that the examiner is combining two and three references in support of the rejections without a showing that the motivation for the combination was suggested by the reference itself. Moreover, none of the references, either singly or in combination, teach all of the elements of the claims. For example, all of the claims recite a **AlGa<sub>N</sub>/Ga<sub>N</sub>** superlattice base layer with a GaN collector layer and a AlGa<sub>N</sub> emitter layer defining base collector and base emitter interfaces. None of the references cited disclose the **AlGa<sub>N</sub>/Ga<sub>N</sub>** superlattice base and the cited interfaces. Moreover, it is respectfully submitted that the examiner has failed to provide a reference that shows that the teachings of one material system are applicable to a different material system. Indeed, none of the references cited by the examiner make reference to any other material systems. Indeed, as is extremely well known in the art, different materials have different properties. This is why the teaching of one material system are not transferrable to other material systems as suggested by the examiner. For all of the above reasons, the examiner is respectfully requested to reconsider the rejection or provide a reference that indicates that the teachings of the material systems.

### CONCLUSION

Accordingly, the Application should be in condition for allowance.

Respectfully submitted,

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